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REMARKS

Claims 1, 4, 5, 40, 41, 43, 51, 53, 54 and 56 have been allowed.

Claims 52, 55, 57, 59, 60, 65-70, 72-75 and 77-80 have been objected to.

Claims 3, 39, 42, 44-50, 58, 61-63, 71, 76, 81 and 82 stand rejected.

Section 103 Rejections:

Claim 3 has been rejected as being obvious in view of Michaelis, Tsukada and Mizutani. Applicants respectfully submit that this rejection is overcome for the reasons set forth below.

Amended claim 3 now includes the following features that are not suggested by the cited references, namely:

- at least one of the electrodes is embedded in the partition wall for controlling, by bending of the embedded electrode, whether the partition wall bends toward a side of the ink pressure chamber, or bends toward a side of the pressure buffer chamber.
- surfaces of the two electrodes are oriented perpendicular to the thickness direction, and the driving portion is polarized in the thickness direction and perpendicular to the surfaces of the electrodes.

The feature of an electrode embedded in a partition wall is shown in FIG. 4, for example. As shown, a partition wall (4a, 4b) includes two electrodes (7a). One of the electrodes is embedded in the partition wall. The **embedded electrode, by bending**, controls whether the partition wall bends toward a side of the ink pressure chamber (3a, 3b) or bends toward a side of the pressure buffer chamber (5). The bending of the embedded electrode is also shown, for example, in FIG. 3 and described in the specification at page 37, bottom

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paragraph as follows: "In this way, the flexing direction of the partition wall 4 serving as the driving portion can be set uniquely based upon the polarity of the voltage to be applied to the electrodes 17a and 17b and the polarizing direction of the driving portion 14a, thereby making it possible to freely control the ejection of the ink filled in the ink pressure chamber."

Michaelis, on the other hand, in FIG. 10(b) discloses first and second partition walls 603 (as indicated by the Examiner). Each partition wall includes two electrodes 619 and 621 (shown in FIG. 9(a)). **These electrodes, however, are not embedded in each partition wall.** Instead, electrode 619 is exposed to ink pressure chamber 613 and electrode 621 is exposed to buffer chamber 615. Michaelis is thus different from amended claim 3.

Tsukada discloses a piezoelectric device that includes upper electrode 18 and lower electrode 14, as shown in FIG. 7. Tsukada does not have any partition wall that is similar to applicants' first and second partition walls recited in claim 3. **Tsukada also does not disclose electrodes embedded in a partition wall.** (Tsukada is cited by the Examiner for sintering of a block). Thus, Tsukada is different from amended claim 3.

Mizutani teaches, as noted by the Examiner, an electrode embedded in a partition wall, as shown in FIG. 2 (element 12B). This embedded electrode is also shown in FIG. 9 as element 12 in partition wall 40. Embedded electrode 12 is grounded and an electric field in areas 40B or 40C causes ink channel 37A to deform, as shown by dotted lines in FIG. 9 (column 7, lines 26-39). Embedded electrode 12, however, does not bend (i.e. is not deformed). Mizutani thus teaches **an embedded electrode that does not bend.**

Applicants' invention, as recited in amended claim 3, on the other hand, requires that the **embedded electrode, by bending, control the bending of the partition wall.** This feature is not disclosed or suggested by Mizutani.

Moreover, claim 3 also includes a feature previously added to claim 81, namely, that surfaces of the two electrodes are oriented perpendicular to the thickness direction, and the driving portion is polarized in the thickness direction

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and perpendicular to the surfaces of the electrodes. This feature is described in the previous Response, mailed on February 4, 2002, and is incorporated herein by reference. This feature is not disclosed by Michaelis.

Amended claim 3 is now in condition for allowance. Dependent claims 39, 42, 44-50, 52, 55, 57-80, which depend from amended claim 3, are also in condition for allowance.

Claim 81 has also been amended to include the above newly added feature of amended claim 3, namely:

at least one of the electrodes is embedded in the partition wall for controlling, by bending of the embedded electrode, whether said partition wall bends toward a side of said ink pressure chamber, or bends toward a side of said pressure buffer chamber.

Amended claim 81, as well as dependent claim 82, is now in condition for allowance for the same reasons set forth for amended claim 3.

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CONCLUSION

Claims 1, 4, 5, 40, 41, 43, 51, 53, 54 and 56 have been allowed.

Claims 3, 39, 42, 44-50, 52, 55, 57-63, and 65-82 are in condition for allowance.

Respectfully Submitted,

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Enclosures: Version with markings to show changes made

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VERSION WITH MARKINGS TO SHOW CHANGES MADEIN THE CLAIMS:

1 3. (As Amended) An ink-jet recording head comprising at least one
2 piezoelectric block having (a) first and second ink pressure chambers, each
3 pressure chamber communicating with a nozzle for ejecting ink supplied from an
4 ink supply, (b) first and second partition walls, each partition wall serving as a
5 driving portion for one of the two ink pressure chambers, each partition wall
6 including a piezoelectric element and at least two electrodes for driving said
7 piezoelectric element, (c) a pressure buffer chamber, and (d) first and second
8 fixed walls,

9 wherein at least one of said electrodes is embedded in said partition wall
10 for controlling, by bending of the embedded electrode, whether said partition wall
11 bends toward a side of said ink pressure chamber, or bends toward a side of said
12 pressure buffer chamber,

13 the first ink pressure chamber, the first partition wall, said pressure buffer
14 chamber, the second partition wall and the second ink pressure chamber are
15 arranged in sequence along a thickness direction of said piezoelectric block,

16 said first fixed wall disposed adjacent to said first ink pressure chamber
17 and said second fixed wall disposed adjacent to said second ink pressure
18 chamber, and

said 1st & 2nd fixed walls are not bent,

19 the piezoelectric block is an integrally sintered one piece block structure,
20 and

21 surfaces of the two electrodes are oriented perpendicular to the thickness
22 direction, the driving portion is polarized in the thickness direction and
23 perpendicular to the surfaces of the electrodes.

1 81. (As Amended) An ink-jet recording head comprising at least one
2 piezoelectric block having (a) first and second ink pressure chambers, each
3 pressure chamber communicating with a nozzle for ejecting ink supplied from an
4 ink supply, (b) first and second partition walls, each partition wall serving as a
5 driving portion for one of the two ink pressure chambers, each partition wall

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6 including a piezoelectric element and at least two electrodes for driving said
7 piezoelectric element, (c) a pressure buffer chamber, and (d) first and second
8 fixed walls,

9 wherein at least one of said electrodes is embedded in said partition wall
10 for controlling, by bending of the embedded electrode, whether said partition wall
11 bends toward a side of said ink pressure chamber, or bends toward a side of said
12 pressure buffer chamber,

13 the first ink pressure chamber, the first partition wall, said pressure buffer
14 chamber, the second partition wall and the second ink pressure chamber are
15 arranged in sequence along a thickness direction of said piezoelectric block,

16 said first fixed wall disposed adjacent to said first ink pressure chamber
17 and said second fixed wall disposed adjacent to said second ink pressure
18 chamber, and

19 surfaces of the two electrodes are oriented perpendicular to the thickness
20 direction, the driving portion is polarized in the thickness direction and
21 perpendicular to the surfaces of the electrodes.